STUDIES OF SEEDS GERMINATION AS A TECHNICAL STAGE IN THE PRODUCTION OF MICROGREENS

STUDIUL GERMINAȚIEI SEMINȚELOR CA ETAPĂ TEHNICĂ ÎN PRODUCEREA LEGUMELOR DE TIP MICROGREENS

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Abstract. *The paper addresses research on the possibility of optimizing the production of "microgreens", by assessing the seed germination regime in radish (Raphanus sativus L. convar. sativus) depending on different temperatures: 15°C, 20°C and 25°C. The results show that there are no significant differences for this species for the three types of temperature studied.*
Keywords: microgreens, seeds, germination

Rezumat. *Lucrarea abordează cerecetări privind posibilitatea de optimizare a producției de "microgreens", prin evaluarea regimului de germinație a semințelor la ridiche (Raphanus sativus L. convar. sativus) în funcție de diferite temperaturi: 15ºC, 20ºC şi 25ºC. Rezultatele arată că pentru această specie nu sunt înregistrate diferențe semnificative pentru cele trei tipuri de temperaturi luate în studiu.*
Cuvinte cheie: microgreens, semințe, germinație

INTRODUCTION

Microgreens are a new category food products, of different to sprouts and *"baby"* plants, with a height of 3 to 10 cm, a short vegetation period, a novel appearance and high nutritional value (Franks and Richardson, 2009; Xiao, 2013; Di Gioia and Santamaria, 2015; Kyriacou *et al.,* 2016).

The germination testing of the seeds of *"microgreens"* represents a decisive step for the optimization of their culture (Gupta, 2015; Marcos-Filho, 2015). In this type of crop, with a very short vegetation period, the temperature at which the seeds germinate makes it possible to obtain a crop that ensures an efficient harvest.

The purpose of the paper is the study of indices and seed germination of radish, towards creating a culture of *microgreens.*

MATERIAL AND METHOD

The researches were carried out in the Laboratory of Vegetable Science, within USAMV Iaşi, using the SANYO MLR-35 1H germinator. Experience has been achieved with biological material consisting of seeds at Rapanus Red *Ridicus sativus*

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cousin *radicula*, moon radish. The seeds used are produced by Agrosel, they are not chemically treated, calibrated, and of high physiological purity. With regard to the seed germination study, we used as many as 150 seeds for each study temperature (15°C, 20°C and 25°C). For the temperature of 25°C, humidity was 75%, and the light of an intensity of 1500 lux in the time slot 22:00 and 6:00, while for temperatures of 15°C and 20°C the humidity had a value of 80% between 06:00 and 22:00. Three rehearsals were used, using Petri dishes and filter paper, watering daily using a distilled water sprayer.

Throughout the experiment, daily waterings were made, observations were made regarding the germination of the seeds, and data was collected to evaluate the germination dynamics. Once the embryo breaks the skin of the seed, determinations and observations are made on the dynamics of daily germination, until three days in a row the values were the same, resulting in the total percentage of seed germinated each day for each variation (Gupta, 2015; Daxing *et al.,* 2018).

RESULTS AND DISCUSSIONS

1. Results on the dynamics of germination of radish seeds for temperature of 15°C

We see from table 1 that radish seeds on the third day of the observations on August 6 amounted to 96% of the germination dynamics, maintaining the same in the next two days of observations. In terms of germination rate, radish seeds had the highest value, namely 47% on 5 August and the lowest value (15%) we find it on the first day of the observations, namely on 4 August.

Table 1

Results on the dynamics of germination of radish seeds for temperature of 15°C

Temperature	Days	The germination dynamics		Rate of germination		Velocity of germination (%)	Coefficient of germination velocity (%)
		No.	%	No.	%		
15°C	4.08	29	19	-	-	15	10
	5.08	140	93	111	74	47	32
	6.08	144	96	4	3	36	25
	7.08	144	96	0	0	29	20
	8.08	144	96	0	0	24	17
	9.08	-	-	0	0	-	-

2. Results on the dynamics of germination of radish seeds for the temperature of 20°C

Table 2 shows that radish seeds have a germination dynamics value of 146 on day 4 of the observation - July 27, and the germination rate reaches a 30% on the second day of observations, going down to 14% on 29 July.

Table 2

Results on the dynamics of germination of radish seeds for temperature of 20°C

Temperature	Days	The germination dynamics		Rate of germination		Velocity of germination (%)	Coefficient of germination velocity (%)
		No.	%	No.	%		
20°C	24.07	66	44	-	-	33	23
	25.07	130	86	64	42	43	30
	26.07	145	96	15	10	36	25
	27.07	146	97	1	1	29	20
	28.07	146	97	0	0	24	17
	29.07	146	97	0	0	21	14
	30.07	-	-	-	-	-	-

3. Results on germination of seeds of radish growth temperature of 25°C

The results in table 3 show a radish seed germination with the highest value on September 14, ie 97% germinated seeds, the velocity of germination rate reaches a maximum of 44% on September 13, and the smallest value of germination being recorded on the first day of the observation, namely 4%.

Table 3

Results on the dynamics of germination of radish seeds for temperature of 25°C

Temperature	Days	The germination dynamics		Rate of germination		Velocity of germination (%)	Coefficient of germination velocity (%)
		No.	%	No.	%		
25°C	12.09	6	4	-	-	3	2
	13.09	132	88	126	84	44	30
	14.09	145	97	13	9	36	25
	15.09	145	97	0	0	29	20
	16.09	145	97	0	0	24	17
	17.09	-	-	-	-	-	-

As we can see from figure 1 and figure 2, the radish seeds germinate very well in all three types of temperatures studied, indicating that it is a species suitable for microgreens culture for several growth environments.

Fig. 1 Germination of radish seeds (original photos)

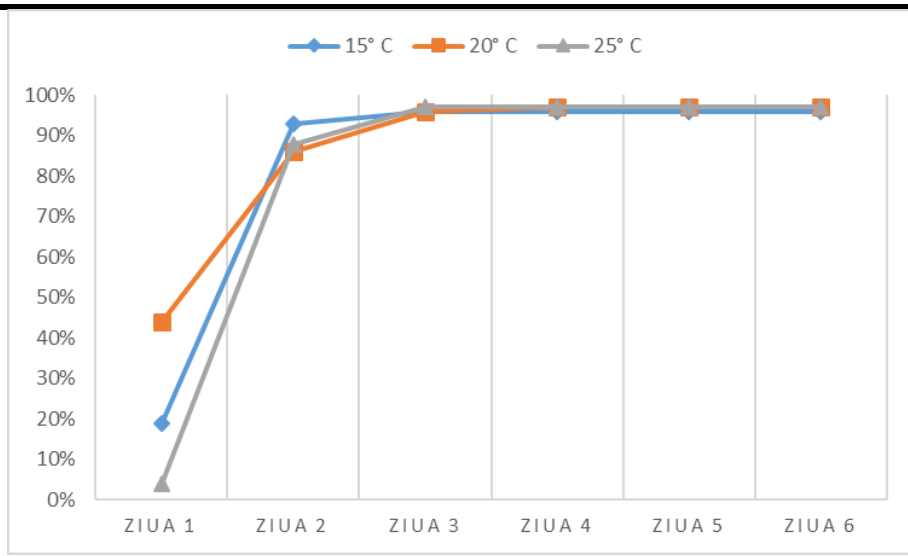

Fig. 2 Dynamics of germination in radish seeds

CONCLUSIONS

1. Temperature is a very important link in the process of gemination of radish seeds grown in microcreens.

2. Red radish seeds germinate well at 15°C, 20°C and 25°C, providing multiple possibilities for use in *microgreens* production.

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